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**Question Paper Code : 61197**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Fifth Semester

Electronics and Communication Engineering

EC 1303 — TRANSMISSION LINES AND WAVEGUIDES

(Regulation 2008)

Time : Three hours Maximum : 100 marks

(Smith card is required)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define delay distortion.
2. Define insertion loss.
3. What is the relation between standing wave ration and reflection coefficient?
4. What is stub?
5. Discuss the two states of critical frequency with respect to frequency.
6. Define phase and group velocities.
7. Draw the field configuration of $TE_{1,1}$.
8. Draw the field configuration of $TM_{2,1}$.
9. Define dominant mode.
10. What is the use of quality factor in the resonator design?

PART B — (5 × 16 = 80 marks)

11. (a) A generator of 1 V, 1000 cycles, supplies power to a 100 mile open wire line terminated in Z0 and having the following parameters: R = 10.4 ohm per mile, L = 0.00367 H/mile, G = $0.8 \times 10^{-6}$ mho per mile, C = 0.00835 $\mu f$ /mile. Calculate characteristic impedance, propagation constant, attenuation and phase constants, velocity of propagation, received voltage, received current and received power.

Or

(b) Calculate the transmission line parameters and reflection coefficient $Z_0$. A generator of 1.5 V, 1000 cycles, supplies power to a 200 mile open wire line terminated in 200 ohms resistance and having the following parameters: R = 11.4 ohm per mile, L = 0.00237 H/mile, $G = 0.75 \times 10^{-6}$ mho per mile, C = 0.00655 $\mu f$ / mile.

12. (a) An impedance $Z_R = 41 + j15\,\Omega$ is connected to a coaxial line of $R_0 = 100\ \Omega$. Find the length and distance of open stub to match the load, by the use of smith chart.

Or

(b) An impedance $Z_R = 35 + j55\,\Omega$ is connected to a coaxial line of $R_o = 75\ \Omega$. Find the length and distance of open double stub to match the load and $\lambda/4$ spacing between the stubs, by the use of smith chart.

13. (a) A pair of perfectly conducting planes is separated 8 cm in air. For a frequency of 5000 megacycles with the $TM_1$ mode excited, find the following: cutoff frequency, characteristic impedance, $\beta$, attenuation constant for $f = 0.95 f_c$ and phase and group velocities.

Or

(b) For a frequency of 6000 megacycles and plane separation = 7 cm, find the following for the $T_{E1}$ mode: cutoff frequency, angle of incidence on the planes, phase and group velocities, Is it possible to propagate the $TE_3$ mode?

14. (a) For the $TM_{m,n}$ rectangular waveguide, determine the field components, cutoff frequency, cutoff wavelength, propagation constant, phase and group velocities and characteristic impedance.

Or

(b) For the $TE_{m,n}$ rectangular waveguide, determine the field components, cutoff frequency, cutoff wavelength, propagation constant, phase and group velocities and characteristic impedance.

15. (a) For the $TM_{m,n}$ circular waveguide, determine the field components, cutoff frequency, cutoff wavelength, propagation constant, phase and group velocities and characteristic impedance.

Or

(b) For the rectangular cavity resonator, determine the field components, resonant frequency, propagation constant, and quality factor.

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